

4th Latin American International Conference on **Sustainable Engineering and Education (LAICSEE-2026)**

19th - 20th June, 2026 | Lima, Peru



Organized by:



IFERP Academy - Peru Society



4th Latin American International Conference on Sustainable Engineering and Education
(LAICSEE-2026)

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Conference Theme



“Transforming Education through
Digital Innovation”

Preface

We cordially invite you to attend the 4th Latin American International Conference on Sustainable Engineering and Education (LAICSEE-2026) on 19th-20th June, 2026. The main objective of LAICSEE-2026 is to provide a platform for researchers, students, academicians as well as industrial professionals from all over the world to present their research results and development activities in relevant fields of Sustainable Engineering and Education. This conference will provide opportunities for the delegates to exchange new ideas and experience face to face, to establish business or research relationship and to find global partners for future collaboration.

These proceedings collect the up-to-date, comprehensive and worldwide state-of-art knowledge on cutting edge development of academia as well as industries. All accepted papers were subjected to strict peer-reviewing by a panel of expert referees. The papers have been selected for these proceedings because of their quality and the relevance to the conference. We hope these proceedings will not only provide the readers a broad overview of the latest research results but also will provide the readers a valuable summary and reference in these fields.

The conference is supported by many universities, research institutes and colleges. Many professors played an important role in the successful holding of the conference, so we would like to take this opportunity to express our sincere gratitude and highest respects to them. They have worked very hard in reviewing papers and making valuable suggestions for the authors to improve their work. We also would like to express our gratitude to the external reviewers, for providing extra help in there view process, and to the authors for contributing their research result to the conference.

We would like to extend our appreciation to all participants in the conference for their great contribution to the success of LAICSEE-2026. We would like to thank the keynote and individual speakers and all participating authors for their hard work and time. We also sincerely appreciate the work by the technical program committee and all reviewers, whose contributions made this conference possible. We would like to extend our thanks to all the referees for their constructive comments on all papers; especially, we would like to thank to organizing committee for their hard work.

About LAISCEE-2026

About the Conference

The event focuses on integrating sustainable engineering innovations with transformative educational practices. It serves as a platform to share research, implementation strategies, and real-world success stories.

Purpose

To exchange insights, foster collaboration, and accelerate impactful solutions for a more sustainable world. Our goal is to strengthen environmental stewardship and empower future professionals with sustainability skills.

Conference Theme

"Transforming Education through Digital Innovation".

The theme reflects the pressing global need to redesign education for the digital era. **LAISCEE 2026 will bring together educators, technologists, researchers, and innovators to co-create smart, technology-driven educational solutions** that make learning more accessible, engaging, intelligent, and future-ready in a rapidly evolving world.

Conference Objectives

The primary aim of LAISCEE 2026 is to accelerate digital transformation in education and create inclusive, accessible, and future-ready learning ecosystems. The conference focuses on:

- **Fostering Innovation in Education**
Introducing and implementing new technologies that transform teaching and learning.
- **Promoting Global Access and Inclusion**
Ensuring equitable opportunities for learners through digital platforms and tools.
- **Bridging Academia, Industry, and Policy**
Connecting stakeholders to build practical solutions for modern education.
- **Empowering Future Educators and Learners**
Offering opportunities for students, educators, and early-career professionals to lead digital change.

About IFERP

The IFERP Academy is a committed professional organization that advances engineering, science, and technology. IFERP anticipates a global scientific community brought together by digital innovation. This organization puts a great emphasis on promoting research activities, communicating the newest insights, and driving industrial trends.

IFERP has built strong networks throughout Asia, the Middle East, Europe, and countries such as Iraq, Malaysia, Australia, and more. They have incorporated networking, research support, publications, and worked in other scientific areas.

IFERP excels in organizing **International Conferences** that connect researchers worldwide. It holds important **international webinars**, publishes journals and publications that are indexed by Web of Science and SCOPUS, and provides thorough **research assistance and guidance**. Engaging in Youth Empowerment projects and encouraging Industry-Institute Interaction are key components of IFERP's goal. The organization is committed to enabling professionals through faculty advancement, skill development, and persistent research and publication initiatives.

- **Global Community Building:** IFERP exerts a lot of effort in building new communities all over the world. As community organizers, we control the conversations & inculcate passion for innovation amongst diverse groups.
- **Promoting Innovation Schemes:** IFERP has several schemes for students, professionals, researchers & organizations to being distinct innovators across all technology streams & sub disciplines.
- **Publicizing Research Publication:** Publication of research is the crucial aspect of IFERP's activities. IFERP also serves as a support center for early - career researchers aspiring to publish world-class research papers.
- **Our Origin:** Established by the Technoarete Research & Development Association (TRADA), IFERP was meant to serve as an accelerant for technological innovation worldwide.
- **Facilitating Multi-Disciplinary Collaborations:** IFERP encourages networking & collaborative partnerships on all fronts to result in a diverse collaborative atmosphere to gain abundance knowledge.
- **Access To Critical Funding & Resources:** IFERP has dedicated itself to fund for various efficient projects & activities to make it achieve successful outcomes beyond just meeting expectations.

What IFERP Does

IFERP is committed to improving the professional experience by providing a world-class platform to professionals. Their dedication extends to the following activities:

- **Academic Resource Accessibility :** They make academic resources and support available to aspiring scholars in both rural and urban locations.
- **Diverse Educational Program :** They organize a wide range of educational events such as workshops, conferences, webinars, seminars, guest lectures, short-term training programs, and faculty development programs.
- **Drive Innovation:** They work hard to foster curiosity and creativity, and stay up to date on the newest trends and advancements in the dynamic field of Engineering, Science, and Technology.
- **Knowledge Sharing and Collaboration:** They believe in the strength of the exchange of knowledge and actively collaborate with institutions, organizations, and associations to contribute to our shared objective of a better future.
- **Publication & Recognition:** They also provide opportunities for research articles to be published in reputable journals and actively promote and encourage transdisciplinary research activities.

IIFERP Mission & Vision

IIFERP's Mission: Upskilling the knowledge hub through technological innovation & excellence for the benefit of humanity.

IIFERP's Vision: A Digitally equipped robust, dynamic & swift professional community integrating academics & industry for upgraded technical implementation.

IIFERP's Value: IIFERP values the restoration of high level technological research, learning, collaboration, resource sharing & community-building traditions.

IIFERP's Goal: To serve as the foundation for all technological progress and advancement activities around the world.

Managing Director, IFERP



Mr. A. Siddh Kumar Chhajer

Managing Director & Founder, IFERP
Technoarete Group, India



Message:

On behalf of IFERP & the organizing Committee, I express my hearty gratitude to the Participants, Keynote Speakers, Delegates, Reviewers and Researchers.

The goal of the 4th Latin American International Conference on Sustainable Engineering and Education (LAICSEE-2026) is to provide knowledge enrichment and innovative technical exchange between international researchers or scholars and practitioners from the academia and industries in various fields of academics. This conference creates solutions in different ways and to share innovative ideas in the field of Sustainable Engineering and Education. LAICSEE-2026 provides a world class stage to the Researchers, Professionals, Scientists, Academicians, and students to engage in very challenging conversations, assess the current body of research and determine knowledge and capability gaps.

LAICSEE-2026 will explore the new horizons of innovations from distinguished researchers, scientists and eminent authors in academia and industry working for the advancements in Sustainable Engineering and Education from all over the world. LAICSEE-2026 hopes to set the perfect platform for participants to establish careers as successful and globally renowned specialists in various fields of Academics.

Chief Executive Officer, IFERP



Mr. Rudra Bhanu Satpathy

Chief Executive Officer & Founder, IFERP
Technoarete Group, India



Message:

IFERP is hosting the 4th Latin American International Conference on Sustainable Engineering and Education (LAICSEE-2026) this year in month of June. The main objective of LAICSEE-2026 is to grant the amazing opportunity to learn about groundbreaking developments in modern industry, talk through difficult workplace scenarios with peers who experience the same pain points, and experience enormous growth and development as a professional. There will be no shortage of continuous networking opportunities and informational sessions. The sessions serve as an excellent opportunity to soak up information from widely respected experts. Connecting with fellow professionals and sharing the success stories of your firm is an excellent way to build relations and become known as a thought leader.

I express my hearty gratitude to all my Colleagues, Staffs, Professors, Reviewers and Members of organizing committee for their hearty and dedicated support to make this conference successful. I am also thankful to all our delegates for their pain staking effort to make this conference successful.



Keynote Speaker



Prof. Dr. Ernesto Cuadros-Vargas

National University of Engineering (UNI)
Peru



Biography:

Ernesto Cuadros-Vargas obtained his Ph.D. in Computer Science from ICMC, University of São Paulo (Brazil), in 2004, conducting collaborative projects and studies at Carnegie Mellon University (USA) in 2001 and Technische Universität Berlin (Germany) in 2002. He is the founder and a member of the Peruvian Computing Society, where he served as President for eight years. From 2009 to 2016, Prof. Cuadros-Vargas held the position of Executive Secretary of the Latin American Computing Center (CLEI). He was a member of the Board of Governors of the IEEE Computer Society (2020-2023). Notably, he was the sole Latin American member on the Steering Committee of ACM/IEEE-CS Computing Curricula (CC2020). He also held the same position in the ACM/IEEE-CS Computing Curricula for Computer Science (CS2013). Prof Ernesto is a Distinguished Speaker of the ACM (2025-2027). Ernesto Cuadros-Vargas had a distinguished tenure as the Director of the Computer Science program and Dean for 16 years in Peru (2005-2020). He has provided advisory services to the Minister of Education and served as a direct advisor to the President of the Republic of Peru (2016-2018). Additionally, he serves as an international accreditation evaluator. Professor Cuadros has been invited as a speaker at numerous international events in Brazil, Chile, Colombia, the United States, Canada, Russia, Japan, China, India, and Spain, among other countries.

Keynote Speaker



Prof. Dr. Miguel Estrada

Dean, National University of Engineering
Peru



Biography:

PhD, MSc, Eng. Miguel Luis Estrada Mendoza is a distinguished civil engineer and academic leader. He earned his Civil Engineering degree from the National University of Engineering (UNI), Peru, and completed his Master of Science and PhD in Civil Engineering at the University of Tokyo, Japan. He also holds a Postdoctoral degree from the University of Chiba, Japan, and an Honorary Doctorate from the Private University of Tacna. Dr. Estrada Mendoza has served in prominent national and international leadership roles, including Minister of Housing, Construction and Sanitation of Peru; Executive President of SENCICO; Director General of the Japan-Peru Center for Earthquake Engineering Research and Disaster Mitigation (CISMID); and member of the Boards of SEDAPAL and FONAFE. At UNI, he has held positions such as Head of the Academic Department of Roads and Geomatics, professor in graduate programs on Transport and Disaster Risk Management, and full member of the Faculty of Civil Engineering Research Committee. Currently, he is the Dean of the Faculty of Civil Engineering at UNI, Principal Professor and Researcher, Principal Investigator of CISMID-UNI, and Visiting Professor at Ricardo Palma University and ESAN. He is actively involved in national and international professional bodies, including FELACBEJA, REDAP, and seismic engineering societies. A RENACYT-registered researcher, his work focuses on seismic risk, disaster mitigation, and geospatial information management.

Keynote Speaker



**Assoc. Prof. Dr. Farhad Soleimanian
Gharehchopogh**

Dean, Islamic Azad University
Iran



Biography:

Farhad Soleimanian Gharehchopogh is an Associate Professor of Artificial Intelligence at the Faculty of Artificial Intelligence and Advanced Technologies, Urmia Branch, Islamic Azad University, Iran. He earned his PhD in Computer Engineering (Artificial Intelligence) from Hacettepe University, Ankara, Turkey, in 2015. In addition, since 2023, he has been recognized as one of the world's top 2% scientists in Artificial Intelligence. Dr Farhad and his team conduct research in Machine Learning (Optimization, especially with Metaheuristic Algorithms). He also actively engages in outreach and education initiatives, mentoring students, delivering public lectures, and collaborating with research partners. He has authored several papers in prestigious journals and conferences and earned numerous awards and honours for his research contributions. Alongside his academic and research responsibilities, he has occupied several administrative roles, including founding and serving as the dean of the faculty of Artificial Intelligence and Advanced Technologies, Dean of the Computer Engineering Department, and a member of the postgraduate program committee, where he played a key role in creating new Masters and PhD programs at Islamic Azad University, Urmia, Iran. He is a seasoned reviewer for numerous peer-reviewed journals and holds memberships on several conference committees. He remains open to collaborative research in industrial and academic projects and constantly seeks new opportunities and challenges to utilize his expertise.

Keynote Speaker



Assoc. Prof. Dr. Dedi Darwis

Universitas Teknokrat Indonesia
Indonesia

Biography:

Dedi Darwis is an Associate Professor in Computer Science at Universitas Teknokrat Indonesia. He is also the Dean of the Faculty of Engineering and Computer Science at Universitas Teknokrat Indonesia. He actively develops research in the fields of Artificial Intelligence and Steganography. He is a reviewer for accredited national journals and reputable proceedings indexed by Scopus and IEEE. To date, Dedi Darwis is an active researcher funded by the Ministry of Education, Science, and Technology of the Republic of Indonesia. He has received 24 National Competitive Research Grants and 16 National Competitive Community Service Grants. In addition to teaching, Dedi Darwis actively publishes research and community service results. He has published 16 internationally indexed articles and 40 nationally accredited articles. He also has 6 Industrial Patents, and 20 Copyrights at the Ministry of Law of the Republic of Indonesia and published 4 books resulting from his teaching and research, and in 2023 and 2024 he was invited as a Keynote Speaker at the International Conference Artificial Intelligence Journey in Moscow, Russia.

Keynote Speaker



Prof. Dr. Abbas Fadhil Aljuboori

Gulf College
Sultanate of Oman



Biography:

Prof. Dr. Abbas Fadhil Aljuboori is currently the President of the Arab Federation for Digital Empowerment – Iraq Office. He is working at Gulf College, Department of Computing Sciences, Muscat, Sultanate of Oman. He has also worked as a Deputy Dean for Scientific Affairs at AlShaab University, Baghdad, Iraq. He has a PhD in Computer Science from Dongguk University, South Korea. Fulbright Visiting Scholar – University of Central Oklahoma – Edmond – USA –2017. International Advisory Board Member for CT University in India. He worked as a Vice President for Administrative Affairs and Head of Smart Cities Center at the University of Information Technology and Communications, Baghdad, Iraq. Faculty Staff Member at Al Zahra College for Women, Muscat, Oman. Researcher and Manager in the Advanced Institute of Convergence Information Technology (AICIT) – South Korea, Head of Computer Science Department – University of Kerbala. Vice President of the Iraqi Universities Accreditation and Quality Assurance Council for Computer Science and IT. His field of Interest are in Data Mining, Big Data, Artificial Intelligence, Cyber Security, Information Systems, Social Media Analysis, and Smart Applications. He is a member of several academic and Professional Societies. He is an Editor-in-Chief, Editorial Board Member and Reviewer of many eminent International Journals and Conferences worldwide.

Keynote Speaker



Dr. Poovarasi Balan

Monash University Malaysia
Malaysia



Biography:

Dr. Poovarasi Balan is a Senior Lecturer in Chemical Engineering at Monash University Malaysia and a Fellow of the Monash Malaysia Education Academy. She is also a Senior Fellow of the Higher Education Academy (UK), recognized for her leadership in education. Her research spans Education for Sustainable Development (ESD) and advanced biodegradable coatings for magnesium-based biomedical implants, particularly for cardiovascular and orthopedic applications. She has published in top 1% journals and leads internationally funded projects in collaboration with researchers from Australia and Germany. An innovative educator, she integrates Sustainable Development Goals (SDGs) into teaching through creative methods like comics, mind maps, and models, earning teaching awards. She also runs ecoepic.org, a widely visited platform showcasing student work and SDG initiatives. Passionate about mentorship, she treats students as collaborators. She credits her success to her early education at Vivekananda Tamil School and is committed to giving back to the community that shaped her values and vision.

Keynote Speaker



**Lt Col (R) Assoc. Prof.
Ir Ts Dr. Vikneswaran Munikanan**

National Defense University of Malaysia
Malaysia



Biography:

Retired Lieutenant Colonel Associate Professor Ir Ts Dr. Vikneswaran Munikanan is an accomplished academic, researcher, and former military officer with over 15 years of experience in both academia and industry. He holds an Engineering Doctorate from Universiti Teknologi Malaysia and currently serves as Deputy Director (Academic) at the NDUM Institute of Executive Education, as well as a Senior Lecturer in Civil Engineering at the National Defence University of Malaysia (UPNM). His expertise spans environmental engineering, sustainable construction, and defence-related engineering applications. Dr. Vikneswaran has received international recognition, including awards at the British Invention Show and iENA Germany, along with numerous innovation accolades worldwide. He has published over 45 journal articles and 40 conference papers and has led multiple national and university-level research projects. Actively engaged in professional and community initiatives, he also supervises postgraduate students and contributes significantly to advancing sustainable and defence engineering practices.

Session Speaker



Assoc. Prof. Dr Lawrence Arokiasamy

Universiti Teknologi Petronas
Malaysia



Biography:

Dr. Lawrence Arokiasamy is an Associate Professor in the Department of Management at Universiti Teknologi Petronas. He holds a Ph.D. and M.Sc. in Human Resource Development from Universiti Putra Malaysia and a BBA (Hons.) from Universiti Malaya. With over 25 years of experience, he has secured multiple research grants, including national and international projects, and published widely in international journals. His expertise spans human capital, sustainability, and the integration of artificial intelligence in human resource practices. He has published more than 100 papers in SCI/Scopus index. Dr. Lawrence is actively engaged in training and consultancy, working with organizations such as Petronas, Bank Rakyat, KPJ Hospital, MISC Shipping, and Lagenda Properties on ESG, sustainability, and stakeholder management initiatives. A Chartered Manager (FCMI, UK) and member of AHRD (USA) and IHRM (Malaysia), he continues to bridge academia and industry through impactful research and professional engagements.

Session Speaker



**Prof. Abu Sayed Md. Mostafizur
Rahaman**

Jahangirnagar University
Bangladesh



Biography:

Abu Sayed Md. Mostafizur Rahaman, PhD is a Professor in the Department of Computer Science and Engineering at Jahangirnagar University, Bangladesh. He holds a PhD in Computer Science and Engineering from Jahangirnagar University and an MSc in Information Technology (with a focus on Embedded Systems Engineering) from the University of Stuttgart, Germany. His research and academic leadership focus on Digital Forensics, including cybercrime investigation methodologies, secure system design, and forensic readiness, alongside cryptography, IoT, and web security. He is actively engaged in advancing sustainable, practice-oriented education and capacity building in cybersecurity and digital forensics.

Session Speaker



Prof. Dr. Johan @ Eddy Luaran

Deputy Dean
Research and Industry Linkages
Universiti Teknologi MARA (UiTM)
Malaysia



Biography:

Johan @ Eddy Luaran is a Professor of Education at the Faculty of Education, Universiti Teknologi MARA (UiTM), Malaysia, with over 20 years of teaching and learning experience in diverse contexts. He has dedicated his career to researching and supporting meaningful learning for students. After obtaining his Bachelor's degree in Chemical Engineering, he pursued his passion for education and earned a Master's Degree and a PhD in Educational Technology. His research focuses on the use of technology to promote effective learning, and he has authored several Scopus-indexed papers in this area. Prof. Dr. Johan has been a leader in several national projects and is recognized for his teaching and learning innovations related to e-learning. In 2014, he was awarded the UiTM e-Learning Award by the Vice-Chancellor, and in 2015 and 2019, he received the Excellence Service Award. Recently he has been appointed as a Visiting Professor for Zhengzhou Preschool Education College (ZZPEC), China. He is currently the Deputy Dean for Research and Industrial Linkages for Faculty of Education, Universiti Teknologi MARA.

Conference Convenor



Prof. Dr. G.P. Ramesh

Conference Convenor
India



Biography:

Dr. G. P. Ramesh is a distinguished academician, visionary technologist and ambitious researcher with over 26 years of multifaceted experience spanning higher education, advanced research and industry leadership. His career reflects a seamless integration of academic excellence and technological innovation, positioning him as a transformative force in engineering education and applied research. A dynamic leader and passionate educator, Dr.G.P.Ramesh has served as Professor and Head of Electronics and Communication Engineering at prestigious institutions across India and abroad. He has mentored undergraduate, postgraduate and doctoral scholars, successfully guiding Twenty-Two Ph.D. candidates and nurturing a culture of inquiry and excellence. His academic expertise encompasses artificial intelligence, machine learning, embedded systems, VLSI design and antenna technologies. With more than 125 publications in Scopus-indexed journals, his scholarly influence is evidenced by an H-index of 32 and an i10-index of 70, marking him as a prominent contributor to global research discourse. He has also organized Twelve International and Six National conferences, publishing proceedings with Springer and ensuring global visibility through Scopus and Web of Science. A pioneer in Outcome-Based Education and a strategic advisor for NAAC, NBA and Autonomous frameworks, Dr.G.P.Ramesh continues to shape future-ready engineers and scalable, tech-driven solutions for India and beyond.

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Design and Implementation of a Pre-Charge Circuit for an Electric Vehicle

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Abstract

This project presents the design and implementation of a precharge circuit intended to enhance the safety and reliability of high-voltage electric vehicle (EV) systems. Precharge circuits play a crucial role in limiting inrush current during system startup by gradually charging the DC-link capacitors of the motor controller, thereby preventing damage to power electronic components and improving overall system performance.

Electric vehicles rely on high-voltage battery packs operating in the range of 300–400 V. During startup, direct connection of the battery to the motor controller can cause inrush currents of several hundred amperes due to uncharged DC-link capacitors. This surge can damage contactors, power semiconductors, and the capacitors themselves, while posing critical safety hazards.

The methodology involves a two-iteration design process encompassing schematic design, SPICE and MATLAB simulation, breadboard prototyping, and PCB fabrication. In Iteration 1, a fundamental control logic was established comprising accumulator voltage sensing, capacitor voltage sensing, comparator-based precharge detection, optocoupler isolation, and relay control via MOSFET drivers. In Iteration 2, the design was enhanced with a Short-Circuit Safety (SCS) check, redundant optocoupler health monitoring, comparator hysteresis, and a dedicated power cycling subsystem on the LV side.

Experimental results demonstrate a significant reduction in inrush current (limited to approximately 137 mA under design conditions), correct relay sequencing, and a precharge completion time of approximately 1.32 seconds. The PCB achieves a minimum creepage and clearance of 13 mm between the HV and LV domains, in compliance with IEC 60664.

Keywords

Precharge Circuit, Electric Vehicle, DC-Link Capacitor, Inrush Current, LM393 Comparator, Optocoupler, MOSFET Driver, PCB Design, AIR, TSMS, EasyEDA.

NextGenElectroShop: A Python-Based Modular E Commerce System for Electronic Product Sales and Inventory Control

Beslin Geo V

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Abstract

The quick expansion of online trade has augmented the need for online shops that are more scalable, safe, and smart. The following project is a Python-based e-commerce framework, ElectroShop-Py, that is aimed at the effective sale of the electronic products with the built-in user interaction, administrative automatization, and safe processing of the transactions. The system is proposed to offer the customers and administrators a single platform to control product browsing, purchasing, inventory, and order tracking in real time. Python web frameworks (Django/Flask) are used to develop the system, and modular architecture is used to achieve scalability and maintainability. Role-based access control identifies customer and administrator functions, whereas the user authentication module provides high security of login and registration. Product sorting and superior search systems are introduced to improve the discovery and browsing of products. A dynamic shopping cart module will enable the user to add, update, and delete products prior to the checkout. Secure APIs facilitate the availability of online payment integration to facilitate smooth digital transactions. On the administrative side, the platform has automated inventory control, order tracking, and product status features via a user-friendly dashboard interface. There are security measures like encrypted data storage, session management, and input validation, which are implemented so as to safeguard user data and prevent the usual web vulnerabilities. The system architecture would be scalable and easily adaptable in case of future inclusion of intelligent recommendation engines and analytics modules. The experimentation proves that the suggested system offers a credible, interactive process and usability when shopping and minimizes efforts of the manual administration. The designed framework is an economical and scalable method to use in the current electronic product retailing software and can be expanded with artificial intelligence-based personalization and real-time analytics to the next-generation e-commerce software.

Keywords

E-Commerce, Python Web Framework, Django, Flask, Secure Online Transactions, Shopping Cart System, Inventory Management, User Authentication, Web-Based Retail Platform, Administrative Dashboard, Scalability, Data Security, Electronic Product Sales.

Individual Economic Sustainability among Absolute Urban Poverty Communities: Obstacles and Initiatives for Intervention

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Abstract

This paper presents the design and simulation of a compact four-port MIMO antenna intended for sub-6 GHz 5G applications, specifically covering the n77/n78 frequency band (3.3–4.2 GHz). The antenna is fabricated on a Rogers R04003C substrate with a relative permittivity of 3.55 and a loss tangent of 0.0027, occupying an overall size of $80 \times 80 \times 0.813 \text{ mm}^3$. Each radiating element consists of a circularly polarized microstrip patch antenna employing corner truncation and is fed through a $50\text{-}\Omega$ inset feed line. To reduce mutual coupling between the antenna elements, a defected ground structure (DGS) incorporating rectangular slots is introduced beneath the feed network, while a T-shaped stub provides additional isolation enhancement. Furthermore, a port-inversion technique is implemented to improve both spatial and polarization diversity. The antenna design is developed and analysed through a three stage optimization process using HFSS Microwave Studio. Simulation results demonstrate an impedance bandwidth of 900 MHz within the desired operating range, with inter-port isolation exceeding 22 dB. The proposed design also achieves an envelope correlation coefficient (ECC) below 0.003, a diversity gain greater than 9.98 dB, a peak realized gain of 6.8 dB, and an axial ratio below 3 dB over an 800 MHz bandwidth. In addition, the voltage standing wave ratio (VSWR) remains below 2 across the operating band. Owing to its compact size, circular polarization capability, and strong isolation performance, the proposed antenna is a promising candidate for future 5G handheld and Internet of Things (IoT) devices.

Keywords

5G MIMO, circularly polarized antenna, defected ground structure, port inversion, sub-6 GHz, envelope correlation coefficient, diversity gain.

Health Guard: Intelligent IOT System for Elderly Care

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Abstract

The rising population of elderly people together with their increasing health problems requires healthcare providers to monitor their health status at all times. The standard healthcare system needs patients to receive hospital checkups while medical staff members must keep track of their condition, which creates high costs and lengthy processes that become unworkable for elderly patients who reside in far-off areas that lack basic facilities. The project developed an IoT-Based Smart Healthcare Monitoring System for Elderly People, which enables continuous health monitoring together with emergency alert creation in real time. The system uses multiple biomedical sensors to track vital body functions because the sensors monitor heart rate and body temperature and blood pressure and detection of body movements that indicate falls. The system uses threshold values to activate a local buzzer alarm, which together with SMS alerts, notifies guardians and doctors about emergency situations. The system allows users to access current health information through a Bluetooth mobile app, which enables them to monitor their health status from a distance. The system uses Internet of Things (IoT) technology to establish uninterrupted system links, which enables medical emergency signals to be identified and treated without delay. The proposed solution is designed to be portable, energy-efficient, cost-effective, and user-friendly, making it particularly suitable for elderly individuals in rural and semiurban regions.

Implementation of CoAP Protocol with NLMS for Microgrid Application

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Abstract

Effective control measures in microgrid applications require precise data collecting and reliable communication. In addition to improve operational performance through noise suppression approaches, this study offers an end-to-end method that enhance communication by eliminating highly severe solutions with lightweight protocols. Destructive interference has been utilized by an adaptive filter to eliminate distorted signals. The flexibility of adaptive filters to dynamically update filter coefficients is an important feature that allows for better coverage towards steady-state error with each iteration. However, the computational complexity associated with higher bit-width operation introduces additional processing delay. To address the limitation, wallace tree multiplier architecture is proposed to accelerate multiplication operations and reduce processing time. In summary, Proposed framework provides an efficient solution for accurate communication and real time data handling in communication relied application by combining lightweight protocol, adaptive filtering and hardware acceleration.

Human Face Recognition using ML for Student Attendance Monitoring

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Abstract

Examining computer accuracy in extracting words from images and video, scientists applied new learning techniques. Blurry shots, written notes, and changing views tended to confuse earlier systems. Because traditional models struggled, a pairing of neural designs improved character detection. Layered filters analyzed visual blocks step by step, much like sight processes detail. Meanwhile, sequence awareness came from dynamic cycles adjusting as data moved forward. What made it work was how spatial analysis joined temporal reasoning – each part feeding into the next without delay. Over time, the system began connecting individual marks by applying unique label strategies while training. Across diverse sets of photos and video snippets, evaluation took place to measure everyday effectiveness. Wobbly footage posed less trouble, just like cluttered scenes or changing light conditions. When tested, identification success outpaced traditional optical character recognition techniques.

Keywords

Optical Character Recognition (OCR), Convolutional Neural Network, Recurrent Neural Network, Deep-learning, Text Detection, Feature Extraction, Sequence to Sequence models (SSM), Connectionist temporal Classification Convolutional Recurrent Neural Network (CRNN).

